

# A Prediction Model for Recognition of Bad Credit Customers in Saman Bank Using Neural Networks

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**Abstract** - *The aim of this paper is to present a model based on feed forward neural networks to recognize bad credit customers in Saman Bank. To find an appropriate structure for the proposed neural network model, three different strategies called quick, dynamic and multiple strategies are investigated. The registered data of credit customer in Saman Bank from 2000 to 2008 year is used. To prevent models from over fitting with training data specifications, according to cross validation, we divide existing data set into three subsets called training, testing, and validation set, respectively. To evaluate the proposed model, we compare the result of three different strategies in neural networks with each other and with some common prediction methods such as decision tree and logistic regression. The results revealed that the three-layer neural network based on the back propagation learning algorithm with quick strategy has higher accuracy.*

**Keywords:** Banking, Saman Bank, feed forward neural networks, prediction, bad credit customers

## 1 Introduction

Since banking industry survival necessitates riskiness, it cannot be prevented and it only can be managed. Risk management is a professional process which its main goal is improving decision quality in all levels of economic institutions including banks, in order to increase wealth of stakeholders. Risk in a financial institution means uncertainty about expected return for assets. One of the main functions of banks is credits granting to real and legal customers. Thus, banks have to minimize probability of any inappropriate decision before granting credit to decrease risk and attract low risk customers.

Credit risk is a result of default probability or probability of loan non-repayment by borrower; this risk is the same as expected loss. Credit risk evaluation is an important topic in financial risk management and has been the major focus of financial and banking industry. Data-mining methods, especially pattern classification, using real-world historical data, are of paramount importance in building such predictive models [1], [2].

Prediction models are classified into two groups. The first group includes models for classifying new credit customers based on their credit risk. The data used for modeling generally consist of financial information and demographic information about the loan applicant. In contrast, the second type of models deals with existing customers and along with other information, payment history information is also used here [3], [4], [5].

In this study, prediction model for new credit customers and prediction of their repayment situation based on neural networks is used. The different learning strategies are used in order to gain high accuracy in neural networks.

The paper is organized as follows. In section II, related literature is reviewed. The collected data from Saman bank customers' are described in section III. In section IV, an overview of the used neural network and its weighting updating way is provided and then different strategies for finding appropriate structure for the proposed model are discussed. Section V modeling results are described, and conclusions as well as recommendations for future works are presented in section VI.

## 2 Literature Review

In search for credit risk prediction model with minimum limiting hypothesis, authors have suggested conditional probability models such as linear probability distribution, Logit model and Probit model [3]. Logit and Probit models are more difficult than discriminant analysis models in terms of calculation. The main problem when using these models is using a long and logical time of time series. They are under influence of econometric limitations such as shorter access period to time series of dishonored data. Then expert systems and artificial intelligence were introduced in this field. Neural networks, genetic algorithm and decision trees are among currently available methods in the field [3], [6].

The use of neural networks in business application has been increased recently. Studies indicate that neural networks are an accurate tool for credit risk assessment among others [7], [8]. Lim and Sohn [9] proposed a neural network-based behavioral scoring model, which dynamically accommodates the changes of borrowers' characteristics after the loans are made. This work suggested that the proposed model could